

MANAGING CALLER PROFILES ACROSS MULTIPLE HOLD QUEUES ACCORDING TO  
AUTHENTICATED CALLER IDENTIFIERS

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## CROSS-REFERENCE TO RELATED APPLICATIONS

The present application is related to the following co-  
pending applications:

0 (1) U.S. Patent Application No. \_\_\_\_/\_\_\_\_ (Attorney Docket  
No. AUS920010825US1);

15 (2) U.S. Patent Application No. \_\_\_\_/\_\_\_\_ (Attorney Docket  
No. AUS920010826US1);

(3) U.S. Patent Application No. \_\_\_\_/\_\_\_\_ (Attorney Docket  
No. AUS920010827US1);

20 (4) U.S. Patent Application No. \_\_\_\_/\_\_\_\_ (Attorney Docket  
No. AUS920010830US1); and

(5) U.S. Patent Application No. \_\_\_\_/\_\_\_\_ (Attorney Docket  
No. AUS920010944US1).

## BACKGROUND OF THE INVENTION

### 1. Technical Field:

5 The present invention relates in general to telecommunications and, in particular, to call hold centers. Still more particularly, the present invention relates to managing caller hold times across multiple hold queues according to authenticated caller identifiers.

### 2. Description of the Related Art:

10 Many companies provide telephone-based access to help staff, sales personnel, representatives, and automated menus via a call center. Where high telephone call traffic is typical in telephone access to a company's representatives, a PBX system receives the call and distributes the call to an automatic call distributor (ACD), thus incorporating a hold function in the call center. ACDs are often employed to provide an even and systematic distribution of incoming calls to multiple representatives. In particular, ACDs typically provide incoming calls with a direct connection to an available representative until all representatives are busy. Then, calling parties are placed in a call queue, and selectively connected to a representative once a representative comes available.

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30 Call queues may cause frustration and ill will of consumers towards a company, particularly where excessively long waits, full queues and accidental disconnects are encountered. One way to alleviate some of the frustration associated with call queues

is by specifying services and information provided to the caller while a caller waits in a call queue. For example, automated messages output to a caller, while the caller is on hold in a call hold queue, may be specified according to the products owned by a caller, the caller's expertise and messages that have been previously played to the caller while on hold.

However, call systems are limited in that each individual call center stores an individual profile for specifying services, requiring a caller to enter a new profile at each call center; requiring a new profile entry at each call center is time consuming and cancels the advantages of specified output. In addition, a caller may only call an individual call center one time, store a profile with the individual call center, and never call the individual call center again to take advantage of the logged profile, thus wasting resources and time.

A further disadvantage of current hold queue systems is that where multiple queues are selectable within a hold queue system, the caller may not always select the proper queue or may need to access multiple representatives where accessing each of the representatives requires waiting in a separate queue within a single call. In such cases, the caller will wait in a first queue to speak to a first representative, only to find out that the caller must wait in an additional queue to speak to a second representative.

Therefore, in view of the foregoing, it would be advantageous to provide a method, system, and program for storing and managing caller profiles including hold times within a call center at a single remote caller profile server that distributes

the caller profiles to multiple call centers and multiple hold queues within a single or multiple call centers. In addition, in view of the foregoing, it would be advantageous to preserve a caller's current time investment in a call center in order to  
5 adjust a caller's position in each hold queue in that call center and across multiple call centers dependent upon previous hold queue times.

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**SUMMARY OF THE INVENTION**

In view of the foregoing, it is therefore an object of the present invention to provide an improved telecommunications system.

It is another object of the present invention to provide a method, system and program for improved call hold queues.

It is yet another object of the present invention to provide a method, system and program for managing caller hold times across multiple hold queues according to authenticated caller identifiers.

According to one aspect of the present invention, a request is received at a caller profile server accessible in a telecommunications network for a caller profile according to an authenticated identifier of a caller currently on hold within a hold queue of a call center. The caller profile is distributed to the call center according to the authenticated identifier, wherein the caller profile is accessible across a multiple call centers according to the authenticated identifier.

According to yet another aspect of the present invention, a call is received from a caller, wherein an identity of the caller is authenticated. The call is placed in a hold queue. A caller profile associated with the identity of the caller is received from the caller profile server. Then, services provided to the caller while on hold may be specified according to the caller profile. In addition, a current position of the call in the hold

queue may be adjusted according to a previous hold history for the caller specified in the caller profile, such that previous time spent holding by said caller is given value.

- 5 All objects, features, and advantages of the present invention will become apparent in the following detailed written description.

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**BRIEF DESCRIPTION OF THE DRAWINGS**

The novel features believed characteristic of the invention are set forth in the appended claims. The invention itself however, as well as a preferred mode of use, further objects and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

**Figure 1** illustrates a block diagram of a telecommunications network in which the present invention may be implemented;

**Figure 2** depicts a block diagram of a network call center system in which the present invention may be implemented;

**Figure 3** illustrates a block diagram of a caller profile server in accordance with the method, system, and program of the present invention;

**Figure 4** depicts a block diagram of an on hold system in accordance with the method, system, and program of the present invention;

**Figure 5** illustrates a representative portion of a caller profile database within a caller profile server is provided in accordance with the method, system, and program of the present invention;

**Figure 6** depicts an illustration of a shift in the position of a call in a hold queue according to on hold points in accordance with the method, system, and program of the present

invention;

**Figure 7** illustrates a high level logic flowchart of a process and program for controlling a switching network in accordance with the method, system, and program of the present invention;

**Figure 8** depicts a high level logic flowchart of a process and program for controlling a PBX system within a call center in accordance with the method, system, and program of the present invention;

**Figure 9** illustrates a high level logic flowchart of a process and program for controlling an on hold system in accordance with the method, system, and program of the present invention; and

**Figure 10** depicts a high level logic flowchart of a process and program for controlling a caller profile server in accordance with the method, system, and program of the present invention.



**DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

A method, system, and program for managing caller profiles for multiple callers across multiple call hold queues are provided. For purposes of the present invention, a caller profile is identified by a subscriber voice identifier (VID) and includes, but is not limited to, personal information about a subscriber, products and services purchased by a subscriber, information service preferences of a subscriber, competition services of a subscriber, survey preferences of a subscriber, and activity performed by a subscriber while on hold across multiple call centers. In addition, a caller profile includes tracking of the current hold times and points granted for a particular call according to current hold times. According to the present invention, it is advantageous that a caller profile be tailored to information that aids specification of on hold activities, however a caller profile may incorporate information utilized for multiple purposes, in addition to specification of on hold activities.

For purposes of the present invention, telephony devices are termed origin devices when utilized for origination of a call to an intermediary device and are termed destination devices when utilized for receipt of a call from an intermediary device. Subscribers to a call are termed callers when originating a call and are termed callees when receiving a call. Callers and callees may or may not be line subscribers to the particular telephony device utilized.

In the following description, for the purposes of explanation, numerous specific details are set forth to provide a

thorough understanding of the present invention. It will be apparent, however, to one skilled in the art that the present invention may be practiced without these specific details. In other instances, well-known structures and devices are shown in block diagram form to avoid unnecessarily obscuring the present invention.

The present invention may be executed in a variety of systems, including a variety of telephone systems, computing systems, and electronic devices under a number of different operating systems. In one embodiment of the present invention, the on hold call queue system is a computer system that incorporates communication features that provide telephony, messaging, and information services to a plurality of callers. In general, the present invention is preferably executed in a computer system that performs computing tasks such as manipulating data in storage that is accessible to the computer system.

With reference now to the figures, and, in particular, with reference now to **Figure 1**, there is depicted a block diagram of a network environment in which the present invention may be implemented. While the present invention is described with reference to one type of network environment, it will be understood by one with skill in the art that the present invention may be implemented in alternate types of network environments.

#### GENERAL NETWORK ENVIRONMENT

First, the network environment incorporates a Public

Switching Telephone Network (PSTN) **10**. As is known in the art the core of PSTN **10** may include multiple telephone networks, each owned by one of multiple independent service providers. Each telephone line is carried by an independent service provider within PSTN **10** and is typically assigned to at least one subscriber.

Switching of a call within an independent service provider's telephone network is considered trusted movement within a trusted network because the call remains within the company's telephone network infrastructure. However, calls may be transferred from one service provider's telephone network to another service provider's telephone network in generally trusted movement. Generally, service providers are in competition with one another and therefore there is general trust in transferring a call, but not trust in sharing of subscriber information from one service provider to the next without security features.

Advantageously, each telephone network within PSTN **10** may access a data network functioning as an extension to PSTN **10** via an Intranet. Data networks may include, for example, subscriber profiles, billing information, and preferences that are utilized by a service provider to specialize services. Transfer of information between a service provider's data network and telephone network is trusted movement in sharing of information.

Further, each telephone network within PSTN **10** may access server systems external to PSTN **10** in the Internet Protocol over the Internet or an Intranet. Such external server systems may include an enterprise server, an Internet service provider (ISP), an access service provider (ASP), a personal computer, and other

computing systems that are accessible via a network. In the present embodiment, transfer of information between PSTN 10 and server systems accessible via network 20 is totally untrusted and therefore may require authentication and additional security.

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In the present invention, network 20 may comprise a private network, Intranet, or a public Internet Protocol network. Specifically, telco application server 22, generic application server 24, pervasive application server 26, and systems management server 28 represent server systems external to PSTN 10 that may be accessed by PSTN 10 over network 20.

In particular, telco application server 22 preferably includes multiple telco specific service applications for providing services to calls transferred to a server external to PSTN 10. In particular, a call may be transferred from PSTN 10 to telco application server 22 to receive at least one service and then the call is transferred back to PSTN 10. Such services may also be provided to calls within PSTN 10, however placing such services at a third party such as telco application server 22, is advantageous because adding services and information to PSTN 10 is time consuming and costly when compared with the time and cost of adding the services through telco application server 22.

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In accord with an advantage of the present invention, as will be further described, the identity of both the caller and the callee may be authenticated by one of telephony devices 8a-8n, PSTN 10, or by telco application server 22. By authenticating the actual identity of the person making a phone

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call and the person receiving the phone call, rather than the identification of a device from which a call is made and received, an enhanced specialization of services to subscribers may be performed.

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An authentication service within telco application server **22** may include identification and verification of the identity of a caller and/or callee of a particular call. Such a service may require that subscribers provide voice samples when setting up a subscription. The stored voice samples may then be compared against voice samples received for a particular call in order to authenticate the identity of a current caller or callee of the particular call.

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Generic application server **24** preferably accesses independent server systems that provide services. For example, a messaging server, a financial server, an Internal Revenue Service (IRS) server, and database management system (DBMS) server may be accessed in HTTP via network **20**. Each of these servers may include a telco service application that requires authentication of the subscriber before access is granted. For example, a financial server may provide a telco service application that allows an authenticated subscriber to access current financial records and request stock quotes from the financial server.

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Pervasive application server **26** manages services for wirelessly networked devices. In particular, pervasive application server **26** preferably handles distribution of wireless packets of voice and data to wirelessly networked devices utilizing a standard such as short messaging service (SMS) messaging or other 3G standards.

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Systems management server **28** manages subscriber personalization via the web. In particular, systems management server **28** includes browser technology that includes a provisioning console **30** for establishing a subscriber profile and a management console **32** for managing and updating the subscriber profile. A subscriber preferably accesses the consoles of systems management server **28** via the Internet utilizing a computing system, such as computing systems **34a-34n**.

The subscriber profile may be accessed at systems management server **28** by other external servers and PSTN **10** via network **20**. In addition, a local copy of a subscriber profile updated in systems management server **28** may be stored within a particular service provider's data network or telephone network. Further, as will be described, a subscriber profile is preferably updated in a caller profile server accessible to call centers **16a-16n**. Each service provider may specify the types of preferences and other information included within a subscriber profile.

In particular, a subscriber may provide a voice imprint when establishing a subscriber profile through provisioning console **30**. Other types of authentication information may also be provided including, but not limited to, a password, an eye scan, a smart card ID, and other biometric information. In addition, a subscriber may designate billing preferences, shopping preferences, buddy list preferences, and other preferences that enable specialized service to the subscriber when the subscriber's identity is authenticated from the voice imprint or other identification.

Advantageously, a management agent is built into each external server to monitor the services provided by each server according to the authenticated subscriber receiving the services.

By monitoring service output according to subscriber, the subscriber may then be billed according to each use of a service.

PSTN **10** preferably includes both voice and data signaling networks that interface with network **20** via gateways. Each of the gateways acts as a switch between PSTN **10** and network **20** that may compress a signal, convert the signal into Internet Protocol (other protocol) packets, and route the packets through network **20** to the appropriate server.

In particular, the voice network interfaces with network **20** through media gateway **14** which supports multiple protocol gateways including, but not limited to, SIP. SIP is a signaling protocol for Internet conferencing, telephony, presence, events notification and instant messaging.

In addition, in particular, the data signaling network interfaces with network **20** through signaling gateway **12** which supports multiple protocol gateways including, but not limited to, parlay protocol gateways and SS7 protocol gateways. Internet servers, such as telco application server **22** may include protocol agents that are enabled to interact with multiple protocols encapsulated in Internet Protocol packets including, but not limited to, SS7 protocol, parlay protocol, and SIP.

Looking into PSTN **10**, a telephone network typically includes multiple switches, such as central office switches **11a-11n**, that originate, terminate, or tandem calls. Central office switches **11a-11n** utilize voice trunks for transferring voice communications and signaling links for transferring signals between signaling points.

Between signaling points, one central office switch sends signaling messages to other central office switches via signaling links to setup, manage, and release voice circuits required to complete a call. In addition, between signaling points, central office switches **11a-11n** query service control points (SCPs) **15** to determine how to route a call. SCPs **15** send a response to the originating central office switch containing the routing number(s) associated with the dialed number.

SCPs **15** may be general purpose computers storing databases of call processing information. While in the present embodiment SCPs **15** are depicted locally within PSTN **10**, in alternate embodiments SCPs **15** may be part of an extended network accessible to PSTN **10** via a network.

One of the functions performed by SCPs **15** is processing calls to and from various subscribers. For example, an SCP may store a record of the services purchased by a subscriber, such as a privacy service. When a call is made to the subscriber, the SCP initiates an announcement to a caller to identify themselves to the subscriber with the privacy service who is being called. According to an advantage of the invention, authentication of the subscriber receiving the call may be required before the privacy service is initiated for that subscriber.



In particular, network traffic between signaling points may be routed via a packet switch called a service transfer point (STP) **13**. STP **13** routes each incoming message to an outgoing signaling link based on routing information. Further, in particular, the signaling network may utilize an SS7 network implementing SS7 protocol.

Central office switches **11a-11n** may also send voice and signaling messages to intelligent peripherals (IP) **17** via voice trunks and signaling channels. IP **17** provides enhanced announcements, enhanced digit collection, and enhanced speech recognition capabilities.

According to an advantage of the present invention, the identity of a caller is authenticated according to voice authentication. Voice authentication is preferably performed by first identifying a subscriber by matching the name or other identifier spoken with a subscriber name or identifier. Next, voice authentication requires verifying that the voice audio signal matches that of the identified subscriber. However, in alternate embodiments, the identity of a subscriber may be authenticated according to passwords, eye scans, encryption, and other biometric methods.

In particular, to perform subscriber authentication of audio signals received from callers, IP **17** may include storage for subscriber specific templates or voice feature information, for use in authenticating subscribers based on speech. If a subscriber specific template is not stored on a local IP **17**, then a remote IP containing the subscriber specific template may be

accessed via a network. In addition, local IP **17** may access systems management server **28** or another repository for voice imprints to access the subscriber specific template.

Where IP **17** authenticates the identity of a caller (e.g. the subscriber placing a call), a voice identifier (VID) representing the authenticated caller identity is transferred as a signal for identifying the caller. In addition, where IP **17** authenticates the identity of a callee (e.g. the subscriber receiving a call), a reverse VID (RVID) including the callee identity is transferred as a signal for identifying the callee.

Advantageously, VIDs indicate through text, voice, or video the identity of a caller. For example, a caller's name may be transferred as the identity of a caller. Alternatively, a video clip stored with the subscriber template may be transferred as the identity of a caller. Additionally, VIDs may indicate the identity of the device utilized by a caller to provide context for a call. Further, VIDs may indicate which system or systems have authenticated the caller identity.

After a VID and/or RVID are determined by IP **17**, IP **17** and SCP **15** may communicate to designate which services are available according to VID and RVID. Advantageously, by designating services according to a VID and/or RVID, caller and callees are provided with services and billed for those services independent of the devices utilized. In particular, a 1129 protocol or other protocol may be utilized to enable signal communications between IP **17** and SCPs **15**. In addition, as previously described, caller authentication to determine VIDs and RVIDs may be performed by a third party, such as telco application server **22**.

An origin telephony device or destination telephony device may also determine a VID and/or RVID for the caller and/or callee of a call. In particular, telephony devices **8a-8n** and call centers **16a-16n** may function as origin and designation telephony devices. Each of the telephony devices may include a database of voice templates that may be matched to authenticate the identity of a caller or callee. In addition, each of the telephony devices may access a third party, such as telco application server **22**, to authenticate the identity of the caller or callee.

In either case, the telephony device transmits a VID and/or RVID with a call to PSTN **10**.

Telephony devices **8a-8n** may include, but are not limited to wireline devices, wireless devices, pervasive device equipped with telephony features, a network computer, a facsimile, a modem, and other devices enabled for network communication. Advantageously, as previously described, a voice authentication functioning device may be included in each of telephony devices **8a-8n**.

In addition, telephony devices **8a-8n** may each incorporate a display that provides a visual output of a VID or RVID. Alternatively, such a display may be provided in a separate device connected to the line in parallel to telephones **8a-8n**.

According to one advantage of the present invention, the identity of the actual caller or actual callee are output to a display in association with a call. In addition, other context information about the caller including, but not limited to, the device from which the call originates or is answered, ratings for a caller or callee, and other context information may be output to a display in association with a call.

Telephony devices **8a-8n** are communicatively connected to PSTN **10** via wireline, wireless, ISDN, and other communication links. Preferably, connections to telephony devices **8a-8n** provide digital transport for two-way voice grade type telephone communications and a channel transporting signaling data messages in both directions between telephony devices **8a-8n** and PSTN **10**.

In addition to telephony devices **8a-8n**, advanced telephone systems, such as call centers **16a-16n**, may be communicatively connected to PSTN **10** via wireline, wireless, ISDN and other communication links. Call centers **16a-16n** may include PBX systems, hold queue systems, private network systems, and other systems that are implemented to handle distribution of calls to multiple representatives or agents.

Returning to central office switches **11a-11n**, typically, one central office switch exists for each exchange or area served by the NXX digits of an NXX-XXXX (seven digit) telephone number or the three digits following the area code digits (NPA) in a ten-digit telephone number. The service provider owning a central office switch also assigns a telephone number to each line connected to each of central office switches **11a-11n**. The assigned telephone number includes the area code (NPA) and exchange code (NXX) for the serving central office and four unique digits (XXXX).

Central office switches **11a-11n** utilize office equipment (OE) numbers to identify specific equipment, such as physical links or circuit connections. For example, a subscriber's line might terminate on a pair of terminals on the main distribution

frame of one of central office switches **11a-11n**. The switch identifies the terminals, and therefore a particular line, by an OE number assigned to that terminal pair. For a variety of reasons, a service provider may assign different telephone numbers to the one line at the same or different times. For example, a local carrier may change the telephone number because a line subscriber sells a house and a new line subscriber moves in and receives a new number. However, the OE number for the terminals and thus the line itself remains the same.

On a normal call, a central office switch will detect an off-hook condition on a line and provide a dial tone. The switch identifies the line by the OE number. The central office switch retrieves profile information corresponding to the OE number and off-hook line. Then, the central office switch receives the dialed digits from the off-hook line terminal and routes the call. The central office switch may route the call over trunks and possibly through one or more central office switches to the central office switch that serves the called party's station or line. The switch terminating a call to a destination will also utilize profile information relating to the destination, for example to forward the call if appropriate, to apply distinctive ringing, etc.

In the present invention, when a central office switch detects an off-hook condition on a line, the central office switch will then determine if a VID signal is transferred from the off-hook telephony device. If a VID is transferred, then a query is made to SCP **15** according to the VID for any services specified for the authenticated caller. Alternatively, a query may be transferred via network **20** to an external server, such as

system management server **28**, to determine the services specified for the caller. The central office switch will then receive the dialed digits from the off-hook line terminal and route the call, providing services according to those preferred by the  
5 authenticated subscriber.

Alternatively, if a VID signal is not transferred from the off-hook telephony device, then the central office switch will provide a dial tone and transfer the call to an IP that prompts the caller to provide a voice entry or other identification.  
10 Alternatively, the central office switch may transfer the call to telco application server **22** for use of the caller authentication service. In either case, the identity for the caller is preferably authenticated, the call is transferred back to the  
15 central office switch, services are provided according to the VID authenticated for the caller, and the call is routed according to dialed digits from the off-hook line terminal.

In addition, an RVID may be provided in the present  
20 invention to authenticate the identity of a callee receiving the call. When a call is answered, the call is transferred back to an IP or telco application server **22** to authenticate the identity of the callee answering the call.

As another alternative to dialed digits from the off-hook  
25 line terminal, a caller may utilize a voice calling function of a telephony device for indicating how the call should be routed. For example, a caller may say the name of a preferred callee. The device or IP **17** may determine a person within the caller's  
30 calling list that matches the voiced name. The matching person's digits are then utilized to route the call.

## CALL CENTER ENVIRONMENT

Referring now to **Figure 2**, there is an illustrative network call center environment in which the present invention may be implemented. It will be appreciated by one with skill in the art that although a particular call center environment is described below, the invention is not limited to use within the described network environment, rather, the inventive queue position advancement process may be implemented within any on-hold information service regardless of the telephony environment.

As illustrated, multiple incoming calls are received at a call center **16a**. In particular, a connection **38** includes a voice trunk and a signal link, such that both voice and VID signals may be received at PXB **40** from PSTN **10**. Connection **38** is preferably connected to PSTN **10** via a wireline, wireless, Internet Protocol network, or other connection. PBX **40** distributes incoming calls to multiple representative terminals **44a-44n** via connection **39**, wherein connection **39** also includes a voice trunk and a signal link. In particular, PBX systems, and in particular PBX systems with automatic call distribution (ACD) ability, are well known in the art as switching systems designed to received telephone calls destined for call center **16a** and to queue those call when a call handling agent is not available.

In the description which follows, it will be assumed that all representative terminals **44a-44n** are busy and therefore PBX **40** cannot respond to an incoming call by making a direct connection to one of representative terminals **44a-44n**. As a result, PBX **40** is forced to place the incoming call on hold.

However, an advantage of the present invention is that when a call is transferred to one of representative terminals **44a-44n**, the VID for the call is also transferred, enabling a representative to receive an authenticated identity of a caller, rather than just the line number from which a call is placed and the name of the subscriber of that line number. Additional authentication may be required by PBX **40** where callers are accessing sensitive information from representatives.

After placing the incoming call on hold, the VID, time of call, and other information received by PBX **40** are forwarded to on hold system **42**. On hold system **42** preferably creates a record based on the call and positions the call within one of call queues **46a-46n**. In particular, the call queue selected for a call is specified by a caller indication of the subject matter of a call. In addition, a single call queue may be utilized to store all calls on hold.

While in the present embodiment PBX **40** forwards calls to a single on hold system, in alternate embodiments, PBX **40** may forward calls to multiple on hold systems and to multiple call centers. In addition, on hold system **42** and other on hold systems may be coupled to PBX **40** or may be remotely accessed by PBX **40**. Further, while in the present embodiment on hold system **42** is depicted as an independent system, on hold system **42** may also be incorporated within PBX **40**.

While the call is on hold, an interactive voice response unit (IVRU) **41**, coupled to PBX **40** and on hold system **42**, may offer the caller a menu of available options for receiving call hold queue information for on hold system **42**. In general, IVRU



41 is a voice information system which may be arranged to (i) prompt a caller for specific information by asking questions based on a set of modules in a transactions script, (ii) collect that information by detecting and interpreting dual tone multifrequency (DTMF) signals entered by the caller or by recognized speech input by the caller, (iii) organize the collected information in a specific format and (iv) forward the collected information to be utilized within on hold system 42. For purposes of the present invention, prompts to the caller may be in voice, text, video, and/or graphical formats depending on the interface receiving the prompt. In addition to or as an alternative to IVRU 41, a voice browser may be utilized interact with a caller according to voice XML scripted pages.

According to one advantage of the present invention, a caller profile for the VID may be accessed by on hold system 42 from a caller profile server 50. On hold system 42 may then utilize the caller profile to specify the menu of available options and other services provided to the caller while the caller is on hold. In particular, a caller profile may include hold points or previous hold times calculated for a caller. On hold system 42 may utilize the hold points to determine whether a caller should be adjusted in position within a call hold queue.

Caller profile server 50 preferably includes profiles for multiple callers stored according to VIDs that are accessible across multiple call centers 16a-16n. Caller profile server 50 may be located within the extended network of PSTN 10 as a database that is preferably shared across multiple service providers accessible via an Intranet. Alternatively, as depicted, caller profile server 50 may be located in the external

network of PSTN **10**, where the external network is available via network **20**.

As illustrated, on hold system **42** accesses caller profile server **50** via network **20**. Advantageously, by storing caller profiles in caller profile server **50** according to VID, only a single identifier is needed to access a caller profile and only a single location is provided for access to a caller profile. Further, advantageously, a caller is only required to enter preferences and other information in one location, for storage according to VID, where the information is then accessible to multiple diverse call centers and other systems. As an additional advantage, different portions of a caller profile may be stored in different server system locations, but each referenced for a single caller according to that caller's VID.

In addition to requesting caller profiles, on hold system **42** may transmit caller on hold activity to caller profile server **50** according to a caller VID. On hold activity may include the options selected by a caller while on hold, the times a caller waited in call hold queues, and the time that a caller spent with a representative, for example.

According to another advantage of the present invention, a VID may be authenticated by on hold system **42** and transmitted with requests for caller profiles and logging of caller on hold activity. In particular, call center **16a** may provide authentication of the identity for on hold system **42** in a VID. Alternatively, PSTN **10** or telco application server **22** may authenticate the identity of on hold system **42**. Moreover, caller profile server **50** may authenticate the identity on hold system

42. In this case, authentication may be performed with a password sequence, security protocol, biometric input, encryption, or other secure format.

5 By requiring an on hold system to authenticate transmissions, caller profile server 50 may ensure that only those on hold systems that have subscribed to the service or are verifiable on hold systems, will receive caller profiles. In addition, a VID of an on hold system may be utilized to specify the types of information within a caller profile that are provided to a particular on hold system.

According to further advantage of the present invention, a caller profile may be initiated and adjusted while on hold and off hold. In particular, a profile for a caller may be initiated and added to from any subscribing call center while a caller is on hold. In addition, a profile for a caller may be initiated and adjusted by the caller via a web site interface to caller profile server 24 off-line. In particular, such an interface may be provided by systems management server 28, as described in Figure 1.

Referring now to Figure 3, there is an illustrative block diagram of a caller profile server in accordance with the method, system, and program of the present invention. As depicted, a caller profile server 50 includes a caller profile controller 56 for controlling the functions of caller profile server 50. In particular, caller profile controller 56 may include at least one processor, memory, data storage, system software, and application software that function together.

Caller profile server **50** also includes a call center client database **52**. Advantageously, call centers may be required to subscribe to use of call profile server **50**. In subscribing to use of call profile server **50**, a call center may specify the types of information from a caller profile that are transmitted in response to a request from that call center for a caller profile. Preferably, registered call centers may be stored in call center client database **52** according to call center or on hold system VID. Further, registered call centers may be required to sign a privacy statement that is filed with the call center identifier, to ensure that personal caller information is only utilized privately by the registered call centers.

In addition, caller profile server **50** includes a caller profile database **54**. Caller profile database **27** preferably includes multiple caller profiles stored for multiple callers, where each caller is identifiable by a VID. Caller profiles may include personal information, service preferences, product and service purchase records, previous hold activities, current wait history, and other information that is provided by a caller or monitored by a call center and transferred to call profile server **24**. In addition, a caller profile may include preferences for types of token advancement systems and records of extra tokens earned by the caller for redemption in future calls. Further, a caller profile may include preferences for the interface and format of publication of hold queue information.

In particular, in the present invention, the current wait history for a caller may be further specified according to the hold times of a caller across multiple hold queues, where those hold queues may be within a single on hold system, multiple on

hold systems, and multiple call centers. Caller profile controller **56** may calculate on hold points that are representative of current hold times dependent upon factors including, but not limited to, the support policy of a call center, the caller's standing, previous problem history, and a reason for transferring between hold queues. A formula, such as  $\text{Apoints} + \text{' minutes' * rate@}$  may be implemented to calculate the on hold points, where the rate is determined by the above factors.

With reference now to **Figure 4**, there is an illustrative block diagram of an on hold system in accordance with the method, system, and program of the present invention. As illustrated, on hold system **42** includes a controller **50**, call hold queues **46a-46n**, a network interface **64**, and a data storage system **62** communicatively connected via a bus **63**. Additional systems may be connected along bus **63** that are not depicted herein. In particular, controller **60** comprises conventional computer resources including, but are not limited to, at least one processor, memory, a data storage system, system software and application software, that function together to perform the functions described with reference to controller **60**.

Network interface **64** preferably communicates with PBX **10** via a telephone network or other networking system. In addition, network interface **64** may communicate with network **20** in order to access caller profile server **50**. In particular, network interface **34** receives transfers of calls from PBX **40** and then returns calls to PBX **40** when a call is the next in line within one of call hold queues **46a-46n**.

In the present invention, while a call is holding within one

of call hold queues **46a-46n**, the caller is preferably prompted by IVRU **41** to select from the multiple available service options designated in call queue service options database **68**. However, according to an advantage of the present invention, the service options are first filtered according to the caller profile associated with the VID of the caller, such that the caller is only presented with those options that are specifically designated by the caller and those options which are tailored to the caller according to the caller profile.

A caller profile may be stored locally to on hold system **42** according to VID in caller profile database **66**. In addition, according to an advantage of the present invention, a caller profile may be accessed remotely according to VID from caller profile server **50**.

Caller profiles returned from caller profile server **50** may be stored in caller profile database **66** to supplement or start a caller profile for a particular VID. In particular, it may be advantageous for on hold system **42** to manage a local caller profile for each VID, in addition to accessing the caller profile from caller profile server **50**, where the caller profile includes purchases made by the caller and other information that the caller has specifically disclosed to the on hold system in privacy. In addition, a local caller profile stored in caller profile database **66** advantageously includes a record of current wait history specifically within on hold system **42**, where points are tabulated when callers wait in hold queues.

After a caller selects a service option, the activity of the caller, while on hold, is preferably monitored by on hold system **42**. In particular, the on hold system may monitor the types of

music, news or other audio information listened to, the competitions participated in, the third-parties accessed, and other activities that a caller may participate in while on hold.

The monitored activity may be added to the local caller profile according to VID in caller profile database **66**. In addition, according to an advantage of the present invention, the monitored activity is transmitted according to VID to caller profile server **50**. Where the call is transferred to a third-party system that performs the selected service option, that third-party system may monitor activity and notify on hold system **42** and caller profile server **50** of the monitored activity. For example, a third-party system may provide a competition service.

In addition, after a caller selects a service option, the service is specified according to a caller profile accessible according to VID. By sharing on hold activity across multiple call centers, each call center may avoid repetition of services, unless such repetition is preferred by a caller. For example, where a caller selects a music service, the music service is specified not to play songs that the caller has already listened to within a particular period of time while on hold as indicated within the caller profile according to VID. In addition, the caller profile may indicate specific songs that the caller prefers to hear.

When a call is initially received into PBX **40** or on hold system **42**, where multiple call queues are utilized, the caller may be prompted by IVRU **41** to select from a menu of subject matters of the call. Depending on the subject matter selected, a related one of call hold queues **46a-46n** is utilized to hold the call.

However, within the cycle of a single call, that call may be placed in a single queue multiple times or multiple queues. In a first case, a caller may inadvertently select the wrong subject by entering a keypad entry or voice entry that is different than the one intended. According to a second case, a caller may not be able to discern which menu subject relates to the caller's subject and therefore may not choose the necessary subject. According to a third case, a caller may need to speak with multiple representatives about multiple subjects in a single call. Other cases where a caller may be placed in a single queue multiple times or multiple queues are also relevant.

According to an advantage of the present invention, a caller profile stored locally or remotely according to VID may include the current call hold history of a caller. Where a call is transferred from one call hold queue to another call hold queue, the call is preferably adjusted in position within the queue according wait times that have already occurred during the call.

Thus, if a caller has already waited forty minutes in a first queue only to find out that the caller selected the wrong queue, then some portion of the first hold time is utilized to adjust the position of the caller in the second queue, such that the caller does not lose all the time originally waited when positioned in the second queue.

In particular, the caller profile according to VID is utilized to calculate on hold points utilized to determine the adjustment position within a queue. Different systems may provide different amounts of adjustment depending on the reason for holding or transferring. For example, a caller who has



waited in the wrong queue may not be given as many points for minutes previously on hold as a caller is given who has waited for a first representative and an additional representative is required to fully answer a question.

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In particular, controller **60** may calculate on hold points that are representative of current hold times dependent upon factors including, but not limited to, the support policy of a call center, the caller's standing, previous problem history, and a reason for transferring between hold queues. A formula, such as  $\text{Apoints} + \text{' minutes' * rate@}$  may be implemented to calculate the on hold points, where the rate is determined by the above factors. Further, on hold points may be calculated locally by controller **60**, calculated remotely at a caller profile server, and/or the points may be combined.

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With reference now to **Figure 5**, an illustrative portion of a caller profile database within a caller profile server is provided in accordance with the method, system, and program of the present invention. As depicted, caller profiles **70** include two caller profiles stored according to VID. Information compiled in caller profiles **70** may be accessed from a single or multiple locations for each of the VIDs. For example, one caller profile may be stored at a first caller profile server and a second caller profile stored locally. In another example, the on hold music preferences according to each VID may be accessed from a first third party server while the personal information according to each VID is accessed from a second third party server.

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In the examples, the identity of a caller, or the VID, is

specified by the name of the caller and a number to further specify the name. In one example, the number may represent an additional identifier, such as a social security number or other government identification number.

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First, preferences for each caller are specified, in the present example, according to music, news, and games. Advantageously, by specifying on hold preferences in a caller profile that is accessible across multiple hold centers according to a single identifier, each hold center may automatically specify music output to the caller according to the preferences specified. In alternate embodiments, alternate types of preferences may be specified. In addition, while in the present embodiment generic preferences are specified, in alternate embodiments, more specific preferences, such as weather in a particular zip code, a particular song, a particular game, and other such specifications, may be made.

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Next, personal information for each caller is specified. In the example, personal information includes the sex, age, education, occupation, and typical geographic region of the caller. Personal information may be utilized by an on hold system to tailor the services provided to a caller. For example, instead of just offering a current weather service, a current weather service for the caller's geographical region may be offered. Further, advertising played to the caller may be better targeted according to the age, sex, occupation, education, and special needs of a caller.

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Further, products and services purchased by a caller are specified. For example, the computer, appliance or cable service

utilized by a caller may be recorded. The caller may specify products and services for a caller profile or companies may share product and service information in caller profiles.

5 In addition, a monthly wait history preferably indicates the activity of a caller according to time, service, and specific activity within the service. For example, caller ID A5124440000@ spent thirty minutes on hold listening to classical music. In particular, songs A-G were played, where the titles or reference numbers of songs A-G are provided. In addition, the call system ID may be included with each entry of a monthly wait history.

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20 Moreover, a current wait history for each call is included in a caller profile. The amount of time, the queue in which a caller waits and the reason for transferring to another queue are recorded in a caller profile. In addition, on hold points may be calculated for a caller based on the number of minutes on hold and the reason for transferring. Alternatively, each on hold system may calculate on hold points based on number of minutes on hold and the reason for transferring.

25 Each on hold system may adjust the position of a call in a queue that the call has been transferred to according to the on hold points from a caller profile for the call. Therefore, a caller does not lose the time already on hold when transferring to another call hold queue is required.

30 Moreover, a monthly time spent per representative may be include in a caller profile. The monthly time spent per representative may be utilized to better estimate a caller's time left in the queue. In particular, even after a call transfers from an on hold system to a representative terminal, the caller

activity is monitored.

Referring now to **Figure 6**, there is an illustrative embodiment of a shift in the position of a call in a hold queue according to on hold points in accordance with the method, system, and program of the present invention. In the examples following, the progress of a caller VID A512-33-000@ (hereafter referred to as A512@) is tracked through multiple hold queues A#1@ and A#2@ where on hold points are utilized to adjust the position of the call within hold queue #2.

As depicted, hold queue information **72** include queue information for hold queue #1. The A512@ call has been on hold for sixty minutes within hold queue #1 before a representative is able to answer the call. The caller has been connected with a representative for two minutes.

In the example, the A512@ call is transferred to a new call queue, here hold queue #2. In particular the call is transferred because hold queue #1 does not access representatives that can meet the needs of the caller.

Hold queue points may be calculated for the call according to the amount of time the caller was on hold in hold queue #1. In the example, a rate of A.5@ is utilized for the call. The rate may be determined from multiple factors or may be assigned by the representative transferring the call. Here, the rate is determined from the factor that the caller chose the wrong subject and therefore was placed in the wrong queue.

When the A512@ call is initially transferred to hold queue #2, the call is received in the last position currently available

in hold queue #2 as illustrated at reference numeral **75** of hold queue information **74**. However, the on hold points for the call that are stored in the caller profile are preferably applied to the caller's position within hold queue #2.

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Hold queue information **76** depicts the position of calls within hold queue #2 after the on hold points are applied for the A512@ call. In particular, in this example, thirty on hold points allow the caller to jump in position ahead of any callers who have waited less than thirty minutes. In alternate examples, the value of on hold points may translate into other amounts of adjustment of position within a hold queue.

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In particular, on hold points that are not utilized by the end of a call are preferably stored with a caller profile according to a VID. If a particular caller calls the call center and is placed on hold within a particular period of time after the first call, then the on hold points may apply to the caller's position within the call queue. In another example, call centers may share on hold point information with the caller profile server such that one call center can adjust a caller's position within a hold queue if that caller has already been on hold in a separate call for a lengthy period of time at another call center. In either example, showing the caller that there is value associated with waiting will alleviate caller frustrations, particularly where the caller is spending a large portion of time each day waiting on hold.

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With reference now to **Figure 7**, there is depicted a high level logic flowchart of a process and program for controlling a switching network in accordance with the method, system, and

program of the present invention. As illustrated, the process starts at block **80** and thereafter proceeds to block **82**.

Block **82** illustrates a determination as to whether an off-hook condition is detected in association with an originating telephony device. If an off-hook condition is not detected, then the process iterates at block **82**. If an off-hook condition is detected, then the process passes to block **84**.

Block **84** depicts a determination as to whether a VID is transferred from the off-hook device. The originating telephony device may authenticate an identity for a caller. However, the PSTN or other servers connected thereto may require additional authentication within a trusted network for access to certain types of services. If a VID is received and no additional authentication is required, then the process passes to block **90**.

If a VID is not received or if the PSTN requires additional authentication, then the process passes to block **86**. Block **86** illustrates transferring the call to an intelligent peripheral or a telco application server for authentication. Block **88** depicts a determination as to whether the VID and the call are returned to the switching center. If not, then the process iterates at block **88**. If the VID and the call are returned, then the process passes to block **90**.

Block **90** depicts looking up the caller profile according to VID. The caller profile may be stored in a database within the PSTN, in an extended network to the PSTN or in a network external to the PSTN. Next, block **92** illustrates initiating services designated in the caller profile retrieved according to the VID.

Thereafter, block **94** depicts routing the call and the VID to a

destination device according to received digits or a voice command, and the process passes to block **96**.

Block **96** illustrates a determination as to whether the destination device is detected with a pick-up (off-hook) condition. If the destination device does not pick-up, then the process ends. If the destination device does pick-up, then the process passes to block **98**.

Block **98** depicts a determination as to whether an RVID is transferred from the destination device. If the RVID is transferred, then the process passes to block **104**. If not, then the process passes to block **100**. Block **100** illustrates transferring the call to an intelligent peripheral or telco application server. Next, block **102** depicts a determination as to whether an RVID and call are received back at the switching center. If not, then the process iterates at block **102**. When the RVID and call are received, then the process passes to block **104**.

Block **104** illustrates initiating services designation in a caller profile associated with the RVID. Next, block **106** depicts transferring the RVID to the originating device for output to the caller. Thereafter, block **108** illustrates proceeding with the call, where additional services are applied when applicable, and the process ends.

With reference now to **Figure 8**, there is depicted a high level logic flowchart of a process and program for controlling a PBX system within a call center in accordance with the method, system, and program of the present invention. As illustrated,

the process starts at block **110** and thereafter proceeds to block **112**.

Block **112** depicts a determination as to whether a new call is received. If a new call is received, then the process passes to block **118**. If a new call is not received, then the process passes to block **114**. Block **114** illustrates a determination as to whether or not a call processing request is received. When a call is at the top of the call queue, the call is preferably transferred back to the PBX with a call processing request. If a call processing request is not received, then the process passes to block **112**. If a call process request is received, then the call is transferred to the next available representative with a VID, as depicted at block **116**, and the process ends.

Block **118** illustrates a determination as to whether or not a representative is available. If a representative is available, then the call is transferred to the next available representative with a VID, as illustrated at block **120**, and the process ends. If a representative is not available, then the process passes to block **122**. Block **122** illustrates distributing the call to the on hold system with the VID, and the process ends.

Referring now to **Figure 9**, there is illustrated a high level logic flowchart of a process and program for controlling an on hold system in accordance with the method, system, and program of the present invention. As depicted, the process starts at block **130** and thereafter proceeds to block **132**.

Block **132** illustrates a determination as to the type of event that occurred when an event occurs. If a new call is



received, then the process passes to block **134**. If a caller participates in on hold services, then the process passes to block **160**.

5       Block **134** depicts placing the call in a call queue. Next, block **136** illustrates a determination as to whether local and/or remote caller profile storage is utilized. Both local and remote caller profile storage maybe utilized concurrently. If local caller profile storage is utilized, then the process passes to  
10       block **138**. If remote caller profile storage is utilized, then the process passes to block **146**.

Block **138** illustrates comparing the VID of the call with the local caller profile database. Next, block **140** depicts a determination of whether a VID matches with a VID for a caller profile in the local caller profile database.

15       If a VID does not match, then the caller is prompted to start a caller profile via a voice script or at a web page, as  
20       illustrated at block **144**, and the process passes to block **154**. In particular, regardless of whether a caller starts a profile, profile building for a VID may begin for the current call.

      If a VID does match, then the process passes to block **142**.

25       Block **142** depicts specifying the caller hold options according to the caller profile, and the process passes to block **154**.

      Block **146** depicts transmitting the request to the caller profile service for a caller profile according to the VID. Next, block **148** illustrates a determination as to whether or not a  
30       caller profile is available from the caller profile server for the VID. If a caller profile is not available, then the process

passes to block **144**. If a caller profile is available, then the process passes to block **150**.

Block **150** illustrates updating the local caller profile database with the available caller profile for the VID. Next, block **152** depicts specifying the caller hold options according to the caller profile, and the process passes to block **154**.

Block **154** depicts a determination as to whether a caller profile includes current hold points or multiple holds during the current call. If a caller profile does not include current hold points or multiple holds during the current call, then the process ends. If a caller profile does include current hold points or multiple holds during the current call, then the process passes to block **156**. Block **156** illustrates adjusting the call queue position of the call according to the current hold points or multiple holds during the current call. Each on hold system may make a particular number of adjustments in position of a caller dependent upon the on hold systems needs. Next, block **158** depicts updating the caller profile according to the adjustment in position and hold point usage, and the process ends.

In response to detecting a caller participating in on hold services, block **160** depicts monitoring the time spent on each service utilized by the caller while on hold. Next, block **162** illustrates updating the local caller profile database with the monitored times according to VID. Thereafter, block **164** depicts transferring the monitored times to the caller profile service according to the VID, and the process ends.

With reference now to **Figure 10**, there is illustrated a high level logic flowchart of a process and program for controlling a caller profile server in accordance with the method, system, and program of the present invention. As depicted, the process starts at block **170** and thereafter proceeds to block **172**.

Block **172** illustrates a determination as to the type of event that occurred when an event occurs. If a request for a caller profile according to caller ID is received, then the process passes to block **174**. If a new caller profile entry is received, then the process passes to block **190**. If monitored on hold service activity is received, then the process passes to block **192**.

Block **174** depicts comparing the call center VID with the call center database. Next, block **176** illustrates a determination as to whether the call center is verified by the VID. If the call center is not verified, then a subscription services option is transmitted to the caller center, as depicted at block **178**, and the process ends. If the call center is verified, then the process passes to block **180**.

Block **180** illustrates comparing the caller VID with the caller profile database. Next, block **182** depicts a determination as to whether a caller profile is available for the caller VID. If a caller profile is not available for the caller VID, then an indicator is transmitted to the call center indicating that the caller profile is not available, as illustrated at block **184**, and the process ends. If a caller profile is available, then the process passes to block **186**.

Block **186** depicts filtering the caller profile according to the subscription service for the call center. Next, block **188** illustrates transmitting the filtered caller profile to the requesting call center, and the process ends.

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In response to receiving a new caller profile entry, block **190** illustrates adding the new caller profile entry to the caller profile database according to a caller VID, and the process ends.

In particular, a new caller profile may be received from a call center, received via a web page entry, or received via a voice entry.

In response to receiving monitored on hold service activity, block **192** depicts updating the caller profile database with the monitored on hold service activity according to caller VID. In particular, the monitored on hold service activity may include the monitored times, general services, and activity within the service.

It is important to note that while the present invention has been described in the context of a fully functioning data processing system, those of ordinary skill in the art will appreciate that the processes of the present invention are capable of being distributed in the form of a computer readable medium of instructions and a variety of forms and that the present invention applies equally regardless of the particular type of signal bearing media actually used to carry out the distribution. Examples of computer readable media include recordable-type media, such as a floppy disk, a hard disk drive, a RAM, CD-ROMs, DVD-ROMs, and transmission-type media, such as digital and analog communications links, wired or wireless

communications links using transmission forms, such as, for example, radio frequency and light wave transmissions. The computer readable media may take the form of coded formats that are decoded for actual use in a particular data processing system.

While the invention has been particularly shown and described with reference to a preferred embodiment, it will be understood by those skilled in the art that various changes in form and detail may be made therein without departing from the spirit and scope of the invention.